Oliktok Pipeline Company
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Barry Romberg
Vice President
Oliktok Pipeline Company

25 January 2018

Mr. Jason Walsh
State Pipeline Coordinator
State Pipeline Coordinator's Section
Division of Oil and Gas
3651 Penland Parkway
Anchorage, AK 99508

Re: Request for Authorization: Oliktok Pipeline Conversion of Service to Natural Gas Liquids
Oliktok Pipeline ADL 411731

Dear Mr. Walsh,

On December 28, 2016, the Oliktok Pipeline Company (OPC) reported to you that OPC Shippers were ceasing fuel gas shipments on January 1, 2017, and that the Oliktok Pipeline (OPL) was therefore being placed into "suspended operations" indefinitely. On May 1, 2017, in Letter No. 17-125-AS, you authorized the temporary suspension of service through a formal application process. For the entire duration of the suspension of service, the OPL has been maintained in accordance with all the requirements set forth in the sections and stipulations of the Right-of-Way Lease.

OPC Shippers have now requested that the OPL return to Natural Gas Liquids (NGL) service. The OPC plans to shut the OPL down and discontinue fuel gas service on April 30, 2018 and immediately begin the construction activities required to return the OPL back to natural gas liquids (NGL) service by August 1, 2018. The OPC requests written authorization granting OPC to proceed with converting the OPL to NGL service.

To effectively move the authorization forward, and obtain the required permission to proceed with the start of work no later than April 30, 2018, I have attached the following to this request letter:

- Basis of Design (BoD)
    - Appendix A: List of Abbreviations and Acronyms
    - Appendix B: Maps
    - Appendix C: Construction Execution Plan (CEP)
    - Appendix D: Construction Drawings (IFC)

    "CONFIDENTIAL. These documents contain information that is protected from public disclosure under state and federal laws, including AS 40.25.120; AS 38.05.035; 11 AAC 82.810; and 5 U.S.C. § 552."

    Note: in the IFC, the "Electrical and/or Instrumentation Design Package" contains redlines requiring changes to be made to the cause and effect diagram to remove the closure of ROV-9000 upon fire and gas detection. A new pigging piping configuration is also being worked. These changes will be provided to the SPCS no later than February 28, 2018.

The maps provided in the BoD, Appendix B, describe the scopes of work that will be carried out between Central Processing Facility-1 (CPF-1) and Skid 50 that are necessary to convert the OPL to NGL service. The OPC's Operator, ConocoPhillips Alaska, Inc. will perform the scopes of work between CPF-1 and PS-01 and will oversee the scope of work that BP Exploration (Alaska), Inc. (BPXA) will perform at Skid 50. No temporary use areas will be necessary as all work will be contained in the current dimensions of the Right-of-Way.

At least 30-days prior to transporting fuel gas, OPC will submit to the State Pipeline Coordinator's Section, updated Quality Assurance (QAP) and Surveillance, Monitoring and Maintenance (SMMP) Programs, and the Standard Operating Procedure, OPLM-0000-SD-0011, Pipeline Startup.

Please contact Sandra Pierce at 907-265-6316 or me if you have questions or require additional information.

Sincerely,

Barry Romberg
Vice President

Attachments: Request Letter, Basis of Design and Appendices to the Basis of Design.

cc: Electronic Copy Only

Letter:
CPF3 Operations Superintendent
DOT Compliance Specialist
OPC Senior DOT Pipeline Engineer
OPC Senior Counsel

Letter and Enclosure:
SPCS Records (DNR.PCO.Records@alaska.gov)

OLIKTOK PIPELINE (OPL)

NGL CONVERSION PROJECT

BASIS OF DESIGN

REVISION 0: Submitted to the Department of Natural Resources, Division of Oil and Gas, State Pipeline Coordinator

JANUARY 8, 2018

Contents

1.0 Introduction and Project Description

1.1 Introduction

The Oliktok Pipeline (OPL) NGL Conversion project will convert the line service from Fuel Gas to Natural Gas Liquids (NGL). The project will enable NGLs from the Prudhoe Bay Unit (PBU) to be imported to the Kuparuk River Unit (KRU) via the OPL for Enhanced Oil Recovery (EOR) use. This project is being managed by ConocoPhillips Alaska, Inc (CPAI) on behalf of Oliktok Pipeline Company (OPC).

The OPL System begins at the upstream flange of an 8-inch inlet manual block valve, adjacent to Skid 50, connecting to the OPL transmission pipeline, which is a ~28.06 mile, 16-inch pipeline that runs from Module 501 near Trans-Alaska Pipeline System (TAPS) Pump Station 1 (PS1) to CPF1 in the KRU. Figure 1 shows the general location of the OPL NGL Conversion project.

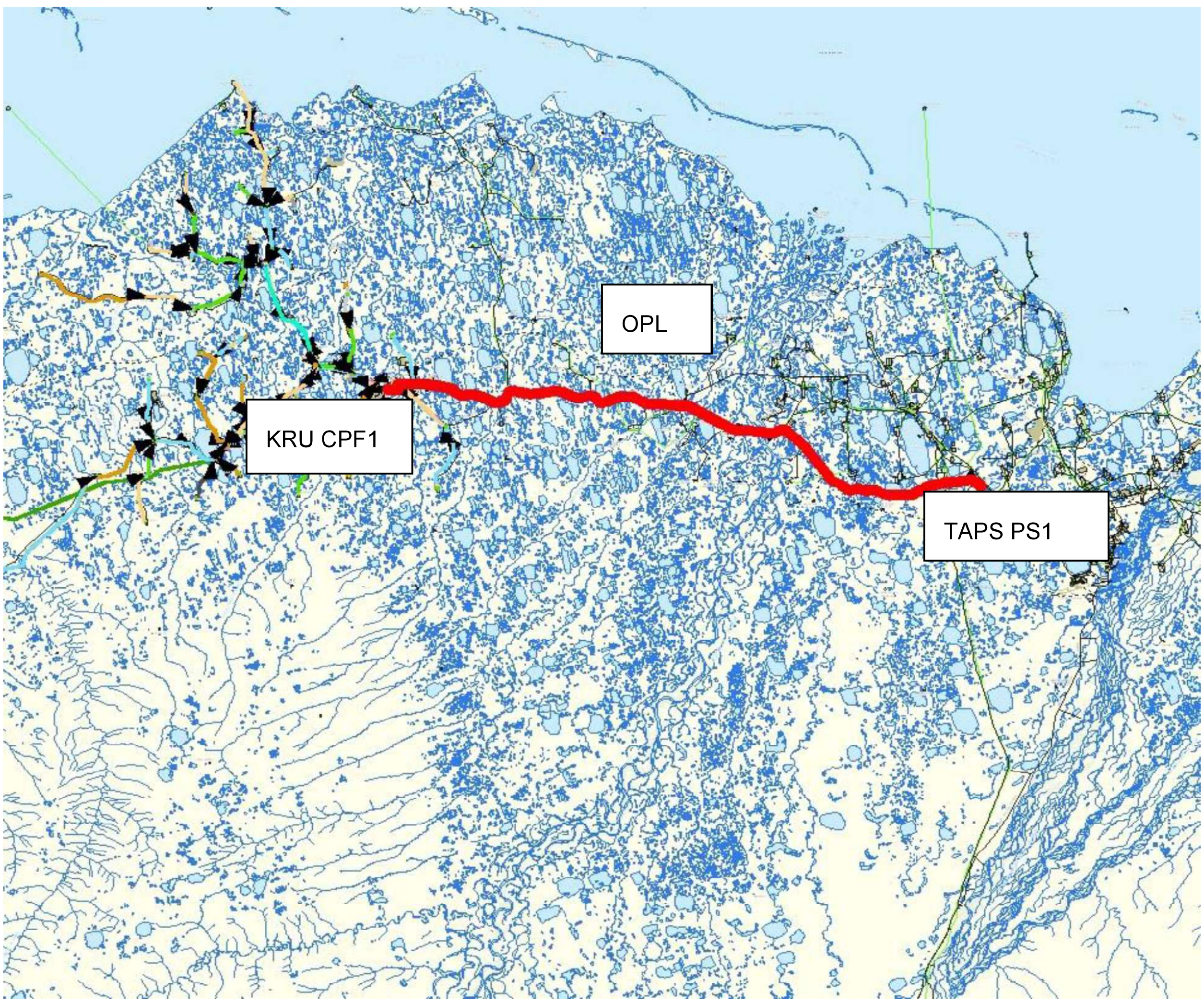

Figure 1: Vicinity Map Oliktok Pipeline NGL Conversion Project

Oliktok Pipeline Company (a ConocoPhillips-owned company) is the Owner of and Right-of-Way (ROW) Leaseholder for the OPL; and is thereby responsible for compliance with the ROW Lease requirements. The Vice President for the OPC is the “Authorized Representative” to perform business related to the OPL ROW Lease. This ensures a consistent approach to the operations and management of the assets, and provides independent oversight and assurance for all pipeline-related requirements for satisfying the terms of the OPL Lease (ADL 411731)[1] and expectations of OPC management. CPAI operates the asset and ensures the development, implementation, and documentation of required programs, policies, and procedures.

The original State of Alaska ROW application was approved for crude oil service in 1981; ADL 402294. The ROW application was resubmitted in 1984; ADL 411731, for natural gas service and approved in 1986. The pipeline was used in natural gas service for two years. It was then idled and remained idle until 1995 when a conversion request to operate the pipeline in NGL service was granted. The pipeline remained in NGL service until a conversion request was approved for conversion of service to fuel gas. The conversion of service was granted in 2013, and the line was converted to fuel gas in late 2014.

Currently in fuel gas service, operation of the OPL is governed by federal regulation 49 CFR Part 192 – Transportation of Natural Gas and other Gas by Pipeline. Once the pipeline is converted back to NGL service it will be subject to 49 CFR Part 195 – Transportation of Hazardous Liquids by Pipeline. Part 195 will require the development and implementation of an Integrity Management Program (IMP) to manage pipeline integrity in High Consequence Areas (HCA). A baseline inspection utilizing inline inspection (ILI, or smart pig), pressure testing or other Department of Transportation (DOT) approved technique is required. CPAI selected ILI as the preferred inspection method and modified the OPL for pigging in 2010. Smart pigging was completed September 2010 with no imminent threats identified. Since that time, the OPL has had an ILI performed every three years, with the most recent inspection completed in September 2016. Each ILI has resulted in no imminent threats to pipe integrity identified.

1.2 Document Scope

This document identifies the design parameters for the conversion of the OPL to NGL service.

All specifications in this document are for the new equipment and piping to be installed at/near CPF1 or Module 501 near PS1. Different standards and specifications may have been used when the existing OPL was installed.

Applicable federal, state, and local codes and regulations will be followed. Applicable codes and standards and CPAI criteria and specifications including the date and version are provided in Section 10.0.

1.3 Project Description

The general scope for the project by area is described below. See Appendix B for additional maps.

The project will convert the existing OPL from fuel gas to NGL service. NGL service from PBU will be distributed via the NGL pipeline at Skid 50 near PS1. Piping modifications to the existing NGL piping at Skid 50 will consist of an extension of the 6-inch line and re-connection to the existing 8-inch line which is the start of the OPL transmission pipeline. The remaining piping modifications to the existing pipe at Skid 50 and at Module 501 near PS1 will be limited to

[1] The State Pipeline Coordinator's Section, a unit of the Division of Oil and Gas, is charged with oversight authority to ensure the Oliktok Pipeline Company remains in compliance with the terms of the Oliktok Pipeline right-of-way lease.

changes as required by 49 CFR 195, and as previously designed. These changes include re-installation of PSVs, pig launcher drain and motive gas connections, automation changes for shut down and blow down logic, addition of controls to prevent blow down, and re-instatement of previous software and logic for leak detection for the OPL in liquid service. Existing blinds and valves will be positioned to establish the proper liquids flow path.

Figure 2: Module 501/Skid 50 Configuration near PS1

Similar minor modifications will be implemented along the mainline OPL, including automation changes for shut down and blow down logic, addition of controls to prevent blow down and re-instatement of software and logic for leak detection for the OPL to meet federal regulatory requirements for a hazardous liquids pipeline. Blow-downs added during the conversion to FG import will be blinded. Additionally, valves within the mainline valve bypass lines will be oriented to prevent blocked in sections of piping.

The remaining piping modification of DOT regulated piping within CPF1 will be to the flow path and boundaries in Module 100, re-installation of PSVs, pig receiver drain gas connections, automation changes for shut down, and re-instatement of previous software and logic for leak detection for the OPL.

The OPL will be ready for NGL service by the 3rd Quarter 2018, however, it is anticipated that PBU fuel gas imports will be available until NGL service design, commercial agreements, and access permissions will allow construction activities to begin.

2.0 Physical Environment

Geographical and meteorological design is in accordance with CPAI criteria and specifications.

2.1 Topography

The project area is the Arctic Coastal Plain located between the Beaufort Sea and the Brooks Mountain Range. The land over which the pipeline traverses is a broad, relatively flat, treeless alluvial fan, rising from the Arctic Ocean toward the foothills of the Brooks Mountain Range. Along most of the route, drainage is poor, because of impermeable underlying permafrost. Typically, the permafrost only melts three (3) to seven (7) feet, and therefore water transport in the soil layer is limited to a relatively thin layer, even in late summer. In this area, runoff and water from thaw of the near surface soils accumulates above the permafrost, resulting in slow run-off into small streams and in the swampy character of much of the tundra during the summer.

Topography is typically flat. Sharp topographic breaks and features are uncommon, although low ridges exist at lake and stream edges and adjacent to ice wedges.

The project will not change the existing OPL routing. See Figure 1 for a map showing the OPL location and area topography.

No changes are anticipated concerning mitigation measures for enhancing wildlife migration and movement from the original application and design or current practices.

2.2 Climate/Meteorology

The mean annual ambient temperature is approximately 9 °F. Ambient temperature ranges from a mean maximum of 45.1 °F during summer months to a mean minimum of -26.6 °F during winter months. Maximum summer temperatures reach 71 °F to 74 °F and minimum winter temperature can drop below -50 °F. The main impact of these extremes is the pipeline is designed to arctic standards, including metallurgy for above-ground supports and pipe rated to a minimum -50 °F.

Winds are generally from the northeast, but wind shifts to the west or northwest are common throughout the summer. Strong westerly and southwesterly winds periodically occur during storms. Mean wind speed varies from a low of 11.9 miles per hour (mph) during the summer to a high of 14.7 mph in the winter. Maximum instantaneous recorded wind speeds in this area vary from 38 mph in early summer to 81 mph in winter.

Mean annual precipitation is approximately five (5) inches per year, with total annual snow accumulation estimated to be approximately ten (10) inches.

2.3 Geotechnical

The area along the pipeline route is underlain by permafrost. In winter, the permafrost extends to the ground surface, except for thaw pockets that are typically located beneath deep lakes and large river channels. By the end of summer thaw depth (i.e., the active layer) under the undisturbed tundra surface is generally less than three (3) to seven (7) feet.

Soils beneath the tundra in the area typically consist of a surficial layer of organic material and silt, with sand and gravel located at greater depth. The base of the silt is typically eight (8) to ten (10) feet beneath the tundra surface in the coastal zone.

The underlying outwash material is typically composed primarily of sandy gravel and gravelly sand with some traces of silt. Although much of the outwash material is ice-bonded, the ice content is generally small in these soils. Occasionally massive bodies of segregated ice are found in this area, the shallower of which are probably associated with ice wedge development. In general, the ice content in soils found from the surface to a depth of fifty (50) feet typically ranges between fifteen (15) and twenty (20) percent.

Permafrost temperatures in these depths vary, depending on the season, depth, moisture content of the active layer, albedo of the ground surface, solar exposure, and insulation provided by snow cover.

For this project, the existing geotechnical data is sufficient for design and execution. No new data is required.

2.4 Hydrology

The project area is located on the Arctic Coastal Plain, which is generally poorly drained, because of the underlying impermeable permafrost and the low slope of the terrain. Most streams in the area are poorly developed, because the frozen ground resists erosion. Small drainages form when near-surface ground ice melts, often along ice-wedge polygon boundaries. The surface in this area consists of polygons, a feature unique to cold regions with low snowfall. Because of the extreme temperature swings of the soil near the surface, expansion and contraction breaks the surface into large interlocking polygons. Ice-water infiltration and freeze-thaw cycles expand the cracks, once they form.

Drainage channels in this area are largely the result of subsidence of soils, due to the melting of ground ice.

Most of the five (5) inches of average annual precipitation falls in the form of snow. A substantial portion of the precipitation is lost to sublimation, a process by which ice and snow evaporate into the air. An average of about three (3) inches of snow generally remains on the ground throughout the winter in small drainages areas. The actual amount available in a particular small drainage basin can vary widely, depending on the ability of the local relief to trap snowdrifts.

The first run-off in early spring occurs as sheet flow over the ground surface. When break-up commences, the first snowmelt runs along the frozen surface of small streams or ponds behind snowdrifts. As break-up progresses, the small snowdrift dams are breached and the accumulated melt water is released to flow downstream until it again ponds behind a larger snowdrift. The storage and release process results in a highly peaked run-off hydrograph with flow during break-up being unsteady and non-uniform. Usually, once the break-up crest passes, recession is rapid. During break-up, the bed and banks of small drainages tend to remain frozen, and erosion rates are low.

Summer floods do not produce design floods for the Arctic Coastal Plains streams. The magnitude of the flow at break-up time is so large that rainfall any other time of the year will not produce a flood stage close to that experienced at break-up (which occurs in late May or June). Rainfall intensity is low and tundra and thaw lakes have a relatively large capacity to absorb summer-storm runoff.

This project does not involve any construction near major water crossings. From PS1 to CPF-1 the OPL crosses the East Fork of the Ugnuravik River, East Milne Creek, Sakonowyak River, Smith Creek, Pebble Creek, the Kuparuk River, and the Putuligayuk River.

2.5 Seismicity

The area is considered to be a region of low earthquake activity. Most seismicity in the area is shallow (less than twenty (20) miles deep), indicating near-surface faulting, but no active faults are recognized at the surface in this area. Seismic engineering calculations for this area typically uses a 10% probability of exceeding 0.05 g earthquake-generated horizontal acceleration in bedrock during a fifty (50) year period in this area (where g = acceleration due to the earth's gravitational field). This is the methodology accepted by the International Building Code and adopted for structures by the State of Alaska.

3.0 Technical

Table 3.01 PBU NGL Design Details

Fluid Details – PBU NGLs	
Temperature (MOD 501)	60° F
Temperature (MOD 100)	35° F
Specific Gravity	0.64
Viscosity	0.29 CP
Import rate (Summer)	10,000 BPD
Import rate (Winter)	4,000 BPD
Import rate (Maximum)	14,000 BPD
Import rate (Minimum)	4,000 BPD

Table 3.02 OPL Design Details

Design Data		
Service		NGL
Line Class		501, 600#
Design Temp	**T**	150° F
MOP based on Flanges		1415 psi

Pipe Data		
Size	**NOM**	16 in
Material		API 5L-X65
Yield Stress	**S**	65000 psi
OD	**D**	16 in
Nominal Thickness	**t**	0.342 in
Des. Joint Eff.	**E**	1
Design Factor	**F**	0.72

Table 3.03 Other OPL Components

Component	Pressure Rating (psi)	Reference
OPL Pig Launcher	1415	Nameplate
OPL Pig Launcher Closure	1415	Nameplate
OPL Pig Receiver	1350@200F	Nameplate
OPL Pig Receiver Closure	1480	Nameplate
Corrosion Coupons	6000	SPC-PT-NS-80400
Valves	1440 (or greater)	Line Class and Valve Data Sheet

3.1 Minimum Design Loads

The minimum design loads for modifications are shown in Table 3.10.

Table 3.10 Minimum Design Loads

Wind Loads	
Basic Wind Speed =	V = 120 mph
Exposure Factor =	C
Wind Importance Factor =	Iw = 1.15
Snow Loads	
Basic Ground Snow Load =	Pg = 50 psf
Occupancy Importance Factor =	I = 1.1
Snow Exposure Coefficient =	Ce = 0.7 Module Roofs Ce = 0.8 Platforms Ce = 0.8 Pipes
Thermal Factor =	Ct = 1.2
Seismic Loads	
Seismic Use Group II, Site Class B	
Seismic Coefficient Ss =	0.38
Seismic Coefficient S1 =	0.10
Seismic Importance Factor =	Ip = 1.25
Pipeways	
Pipeways shall be designed for actual pipe weights plus contents, but not less than 40 psf for each level.	

3.2 Seismic Design Criteria

Seismic design on new construction will be in accordance with CPAI criteria and specifications included in Section 10.

3.3 Geotechnical

The existing 16-inch transmission pipeline from PS1 to CPF1 will remain in place. The existing VSMs were designed to the design criteria submitted as part of the original ROW lease.

3.4 Pipe Stress Criteria

The scope of work for the OPL NGL Conversion Project is subject to the requirements of 49 CFR 195. This federal regulation places limitations on the internal design pressure but does not specify limitations for other loads, loading combinations, or limitations on combined states of stress. Detailed industry requirements are addressed by the ASME B31.4, *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids*: March 31, 2016.

Based on the sustained loads, thermal expansion, and occasional loads, B31.4 code compliance calculated pipeline stresses are categorized as internal pressure stresses, external pressure stresses, allowable expansion stresses, additive longitudinal stresses, effective stresses, operation stresses and test stresses. The general stress criteria are summarized as follows:

- Internal Pressure Stresses – The calculated stresses due to internal pressure.

- External Pressure Stresses – Stresses due to external pressure.
- Allowable Expansion Stresses – Stresses due to expansion for those portions of the piping without substantial axial restraint.
- Additive Longitudinal Stresses – The sum of the longitudinal stresses due to pressure, weight, and other sustained external loadings.
- Effective Stresses – The sum of the circumferential, longitudinal, and radial stresses from internal design pressure and external loads in pipe installed under railroads or highways, as combined in API RP 1102.
- Operation Stresses – The sum of the longitudinal stresses produced by pressure, live and dead loads, and those produced by occasional loads, such as wind or earthquake. It is not necessary to consider wind and earthquake as occurring concurrently.
- Test Stresses – Stresses due to test conditions are not subject to the limitations of other allowable stress limits. It is not necessary to consider other occasional loads, such as wind and earthquake, as occurring concurrently with the live, dead, and test loads existing at the time of test.

3.4.1 Load Combinations

Pipe load conditions will be analyzed to verify 49 CFR 195 and B31.4 code compliance.

3.4.2 Allowable Stresses

Circumferential, longitudinal, shear, and equivalent stresses will be calculated considering stresses from all relevant load combinations. Calculations will consider flexibility and stress concentration factors of components other than straight pipe.

3.5 Corrosion Allowances

Corrosion allowances for new piping is 0.125-inch in accordance with CPAI criteria and specifications.

4.0 Project Components

4.1 Pipeline

See Appendix D for construction drawings.

4.1.1 Flow Rates

Predicted NGL flow from PS1 to CPF1 rates are shown in Table 4.11.

Table 4.11 NGL Flowrates

	Flow (BPD)
Typical	6,000
Design flow	4,000-14,000

4.1.2 Physical Properties Pipeline Materials

The new pipe segment size, wall thickness, and grade are shown in Table 4.12. New piping is being installed inside Module 100 at CPF1 and is not within the DOT boundary.

Table 4.12 Pipe Size, Wall Thickness, and Grade

Type	Size	Wall Thickness	Grade
Straight	8-inch	0.5-inch	Sch XS, SMLS LTCS A333-6

4.1.3 Wind-Induced Vibration (WIV)

As part of the Conversion of Service to Fuel Gas, a WIV analysis was completed by SSD, Inc. in 2012 to determine the optimum TVA tuning and placement design while in either fuel gas or NGL service. This design was implemented as part of the 2014 OPL conversion to fuel gas and will be maintained in the conversion back to NGLs. In general, the WIV response of the OPL is expected to be more pronounced for the lighter FG service than for the heavier NGL service. This is because the WIV response is related to the inverse of the pipeline (weight) mass per unit length. Therefore, the conversion back to NGL service will further reduce the WIV the pipeline may experience.

4.1.4 Pipeline and Equipment Cold Temperature Shutdown Design Basis

PBU NGLs have a freezing temperature well below environmental design basis for low ambient temperatures and no adverse effects are anticipated if the pipeline is shut down at cold ambient temperatures.

4.1.5 Emergency Access, Maintenance and Removal of Pipelines

No changes will be made to the current pipeline configuration. Ice roads will not be used. Access is from existing roads for all mainline pipeline valves.

4.2 Welding

Welding and inspection procedures for this pipeline and DOT facility regulated piping will be performed using procedures and operators qualified according to 49 CFR Part 195, API Standard 1104 and in accordance with CPAI specifications.

All welds will be made with materials that are compatible with the line pipe to avoid local corrosion at the welds and heat affected zones.

4.3 Facilities, Skids, and Modules

There is no plan for any additional facilities, skids or modules.

5.0 Civil Road and Caribou Crossings

The existing road crossings and caribou crossings will not be affected by the conversion of the OPL to NGL service.

6.0 SCADA, Automation, Communications, and Electrical

There will be no new Instrument/Control system added as part of this conversion project, and all automation and electrical changes will be integrated into the existing systems and designed in accordance with applicable codes, standards, and regulatory requirements.

6.1 SCADA

The existing Basic Process Control System (BPCS) and Safety Instrument System (SIS) will be used for all safety critical and non-safety critical process signals. Communications will be unchanged from its current configuration. New instrumentation is not required in this project.

Relevant documents are included below and will be modified for NGL service:

- OPLM-0000-SD-0201 **–** Leak Detection System
- OPLM-0000-D-04 **–** Pipeline Leak Detection System Drawing
- OPLM-0000-SD-0003 **–** Alarm Setpoints and Consequences of Deviations

6.2 OSD/ESD and Pressure Control

The OPL overpressure protection system will be designed to conform to 49 CFR 195.

The OSD/ESD design criteria and relief system description are contained in the following documents which will be modified for NGL service:

- OPLM-0000-SD-0002 **–** Pipeline Control
- OPLM-0000-SD-0003 **–** Alarm Setpoints and Consequences of Deviation
- OPLM-0000-D-02 **–** Isolation and Overpressure Protection
- MPD-L1XX-278, sht. 003 **–** OPL Cause and Effect Matrix

6.3 Leak Detection System Design Criteria

Leak detection consists of metered volume balancing, computational pipeline monitoring (CPM) and visual surveillance. In the event of an alarm, the control board operator proceeds through a series of steps to determine its cause.

Relevant documents, which will be modified for NGL service, include:

- OPLM-0000-SD-0201 – Leak Detection
- OPLM-0000-D-04 **–** Leak Detection System

7.0 Safety

7.1 Safety Plans and Procedures

7.1.1 Oil Discharge Prevention and Contingency Plan, Kuparuk Field and Pipeline, North Slope, Alaska (ODPCP)

The primary goal of the ODPCP is to prevent and plan for the response to a hydrocarbon or other fluid spill. In the event of a spill, the goals of this plan are to limit the spread of the spill, thereby minimizing potential environmental impacts, and to provide for the safety of personnel. Where the two may conflict, safety of personnel will always be given the first consideration. This plan addresses the State of Alaska requirements under Title 18, Chapter 75 of the Alaska Administrative Code (AAC), as amended through December 30, 2006. This plan also contains a section addressing federal regulations (U.S. Environmental Protection Agency [EPA] and U.S. Department of Transportation [DOT]) based on the Oil Pollution Act of 1990 (OPA 90). This plan includes the Spill Prevention, Control, and Countermeasures (SPCC) plan for the OPL, as required by Code of Federal Regulations (CFR) Title 40, Part 112. The ODPCP will be amended to reflect the addition of NGLs in the OPL. This change will not impact any of the planning standards in the ODPCP.

7.1.2 Pipeline Abnormal and Emergency Operations

The revised Oliktok Pipeline Operations Manual will contain the procedures for Abnormal and Emergency Operations as required by 49 CFR Part 195.

Safety systems and operator response information is contained in the following. These will be modified for NGL service:

- OPLM-0000-SD-0021 – Response to Unintended Valve Closure or Pipeline Shutdown
- OPLM-0000-SD-0022 – Response to Abnormal Pressure or Flow
- OPLM-0000-SD-0023 – Response to Communications and Power Failure
- OPLM-0000-SD-0024 – Response to Operation of Pipeline Safety Device
- OPLM-0000-SD-0025 – Response to Pressure Upset in Excess of Safe Operating Limit
- OPLM-0000-SD-0026 – Removal of Overpressure Protection Device
- OPLM-0000-SD-0031 – Notification of Pipeline Emergency
- OPLM-0000-SD-0032 – Pipeline Leak
- OPLM-0000-SD-0033 – Explosion/Fire on Pipeline or Connected Facility
- OPLM-0000-SD-0034 – Field Damage to Pipeline - No Leak

7.1.3 North Slope Emergency Response

North Slope Emergency Response Services is responsible for responding to fires, medical emergencies, HAZMAT, and spills/leaks.

7.1.4 Module Safety Systems

CPF1, including Module 100 has full F&G detection and suppression. Module 501 has F&G detection, but no suppression. Module 504 (REIM near Module 501) has F&G detection and electrically activated Stat-X® aerosol suppression. An ROV will be re-installed in Module CR02 at CPF1 to allow the operator to isolate the pipeline remotely in the event of an NGL leak or plant ESD.

7.2 Process Engineering – Process Design Basis

The facilities changes will be designed in accordance with the following relevant regulations, codes and standards:

- 49 CFR Part 195 Transportation of Hazardous Liquids by Pipeline
- 13 AAC 50.025 2012 International Fire Code (IFC) Adopted by Reference
- API RP 520, Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries
- API RP 521, Standard for Pressure-Relieving Devices and Depressuring Systems
- API RP 752, Management of Hazards Associated with Location of Process Plant Buildings

The ConocoPhillips design criteria and accepted engineering practices that will be followed are listed in Section 10.

8.0 Corrosion Control and Monitoring

8.1 Corrosion Mitigation and Control Plan

There is an ongoing corrosion program to ensure the mechanical integrity of the OPL. The Kuparuk Corrosion Group is responsible for developing and implementing this program, which includes monitoring, inspection, and testing as well as evaluating and recommending repairs and mitigating measures.

The corrosion mitigation and control plan is described in OPLM document:

- OPL-0000-SD-0042 –Oliktok Pipeline Corrosion Program

8.2 Corrosion Coupons

There are two existing corrosion coupons and two existing corrosion probes in the OPL, one at each end of the cross-country piping.

8.3 Coating/Insulation/Jacketing Systems

Coating/insulation/jacketing systems are in accordance with CPAI criteria and specifications as listed in Section 10.

8.4 Pipeline Pigging

The OPL is currently piggable and any modifications required by this conversion of service will not impact the piggability of the pipeline. Design is in accordance with CPAI criteria and specifications specified in Section 10.

8.5 Module Functional Capabilities

No new modules will be installed in this project. Existing modules will be functional for the new service.

8.6 High Consequence Areas

The identification of pipeline segments within HCA was performed following the CPAI IMP, Section 2, High Consequence Area Identification procedure. Previously, CPAI had determined the entire OPL when in NGL service and regulated under 49 CFR Part 195 is located within an HCA.

Figure 3 shows the HCA for the OPL while regulated under 49 CFR 195.

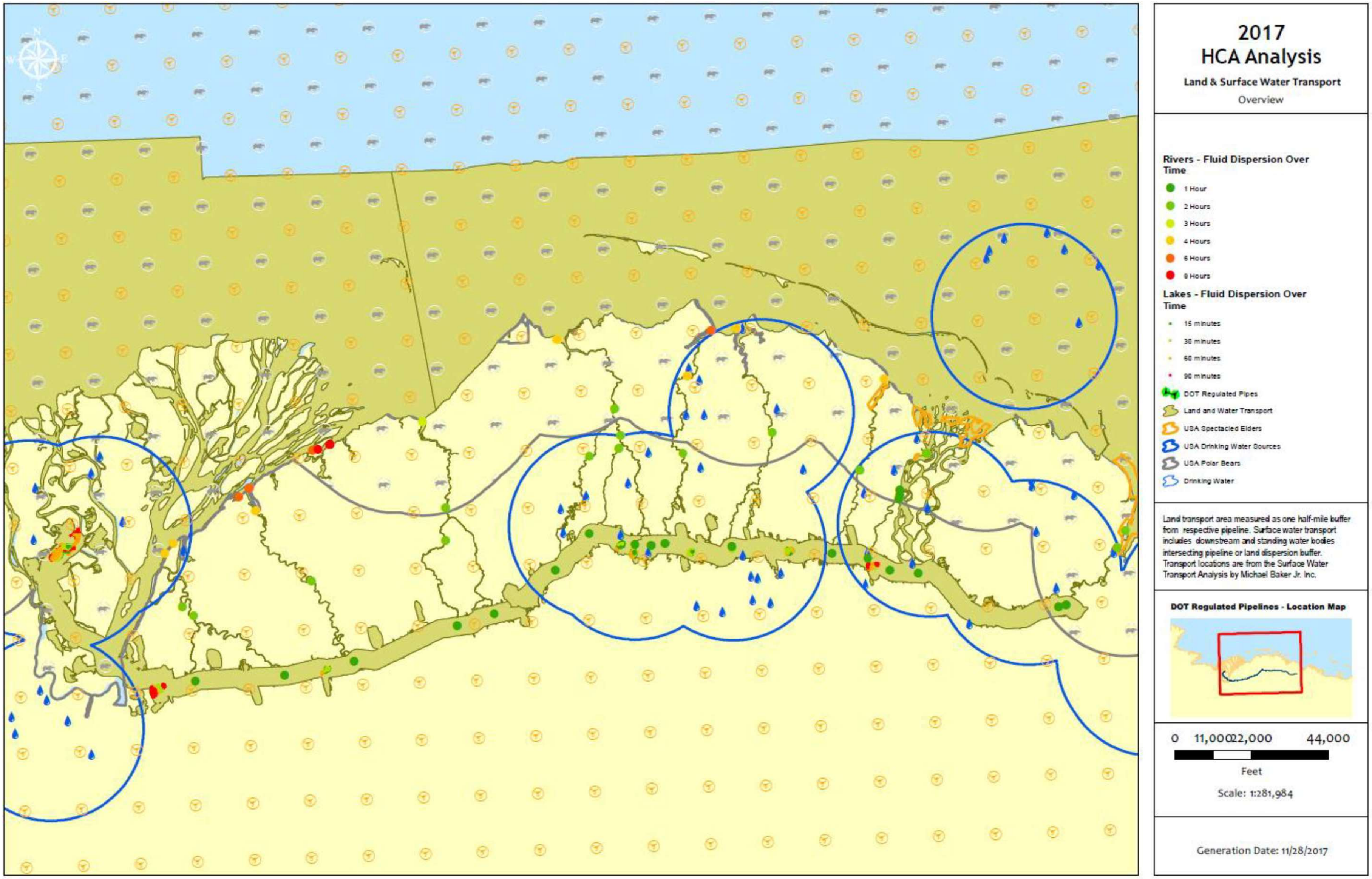

Figure 3: 49 CFR 195 High Consequence Areas in the vicinity of the DOT regulated Pipelines including the OPL.

9.0 Construction

See Appendix C for Construction Execution Plan and Appendix D for Construction Drawings.

10.0 Codes, Standards, and Specifications

This section lists the codes, standards, CPAI criteria and specifications, and other relevant documents for this project.

10.1 Codes and Standards

- 13 AAC 50.025 Fire Code. Alaska State Law adopting International Fire Code (IFC)
- 49 CFR Part 195 - Transportation of Hazardous Liquids by Pipeline
- American Institute of Steel Construction (AISC) Steel Construction Manual, 13th Edition 2005, with errata dated July 20, 2006
- API RP 1162, Public Awareness Programs for Pipeline Operators
- API RP 520, Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries
- API RP 521, Standard for Pressure-Relieving Devices and De-pressuring Systems
- ASME B31.4, 2016 Pipeline Transportation Systems for Liquids and Slurries
- International Building Code (IBC), 2012 Edition
- National Electrical Code (NFPA 70-2014)
- National Electrical Safety Code (ANSI-C2-2012)

10.2 CPAI Criteria and Specifications

Master List of OPL CPAI Criteria and Specifications

Specification #	Title	Revision /	Date
CRT-CE-NS-80001	Architectural/Civil/Structural Criteria	Rev 2	12/31/07
CRT-GA-NS-80002	General Site Conditions Design Criteria	Rev 10	5/31/17
CRT-GA-NS-80003	National Codes and Standards Design Criteria	Rev 2	4/1/10
CRT-HS-NS-80001	Health, Safety and Environmental Protection Design Criteria	Rev 0	5/12/17
CRT-IN-NS-80001	Control Systems Design Criteria	Rev 9	5/4/17
SPC-IN-NS-01-80003	Safety Instrumented Systems Specification	Rev 2	8/21/17
CRT-MP-NS-80005	Relief and Depressuring Criteria	Rev 10	6/1/17
CRT-PT-NS-80001	In-Plant Piping Criteria	Rev 9	5/17/17
CRT-PT-NS-80002	North Slope Pipelines Criteria	Rev 12	4/28/17
SPC-PT-NS-80004	Carbon Steel Pipeline Welding Specification	Rev 10	11/21/17
SPC-EE-NS-80200	Engineered Electrical Equipment Procurement Specification	Rev 3	6/27/10
SPC-EE-NS-80263	Low Voltage Cable Specification	Rev 1	4/30/08
SPC-EE-NS-80300	Electrical Construction Specification	Rev 5	6/6/10
SPC-HP-NS-80001	Module Hydrostatic Testing Specification	Rev 5	2/20/17
SPC-IN-NS-01-80001	Control Systems Installation and Testing Specification	Rev 2	1/4/16
SPC-IN-NS-01-80002	Control Systems Design and Material Specification	Rev 2	9/30/12
SPC-IN-NS-17-80001	Control Systems Control Panel Specification	Rev 3	11/7/16
SPC-MA-NS-80201	Insulation Specification for Module Piping and Equipment	Rev 2	1/12/04
SPC-MP-NS-80001	Process Design Specification	Rev 9	3/26/15
SPC-MP-NS-80002	Process Hazard Analysis Standard	Rev 20	9/16/16
SPC-PT-NS-80003	Module Pipe Welding Specification	Rev 7	10/20/17
SPC-PT-NS-80009	Module Piping Fabrication and Erection Specification	Rev 10	7/14/17

Master List of OPL CPAI Criteria and Specifications

Specification #	Title	Revision / Date	
SPC-PT-NS-80010	Branch Connection Welding Specification	Rev 0	5/31/99
SPC-PT-NS-80012	Low Yield Carbon Steel Pipe, Flanges, and Fittings Specification	Rev 1	1/10/02
SPC-PT-NS-80014	High Yield Carbon Steel Fittings Specification	Rev 1	1/10/02
SPC-PT-NS-80015	High Yield Carbon Steel Pipe Specification	Rev 3	4/26/09
SPC-PT-NS-80017	Plant Piping Design Specification	Rev 12	11/21/16
SPC-PT-NS-80018	North Slope Pipelines Design Specification	Rev 6	10/16/12
SPC-PT-NS-80055	Valve Flange and Anchor Blankets Specification	Rev 2	6/1/07
SPC-PT-NS-80200	In-Plant Module Piping Material Specification	Rev 10	7/14/17
SPC-PT-NS-80201	Line Class A Specification	Rev 8	1/31/06
SPC-PT-NS-80202	Line Class B Specification	Rev 9	11/21/16
SPC-PT-NS-80203	Line Class D Specification	Rev 9	3/2/16
SPC-PT-NS-80208	Utility Line Class Specification	Rev 3	10/4/16
SPC-PT-NS-80215	Pipeline and Well Line Material Specification	Rev 8	7/14/17
SPC-PT-NS-80242	Line Class DNC7 Specification	Rev 2	2/11/03
SPC-PT-NS-80260	Valve Procurement Specification	Rev 13	7/14/17
SPC-PT-NS-80271	Gasket Procurement Specification	Rev 1	2/7/06
SPC-PT-NS-80272	Stud Bolting Procurement Specification	Rev 5	7/14/17
SPC-PT-NS-80301	Preformed Pipeline Insulation Specification	Rev 5	6/13/07
SPC-PT-NS-80302	Foam-In-Place Field Pipeline Insulation Specification	Rev 0	5/31/00
SPC-SS-NS-80300	Structural Steel Welding Specification	Rev 4	8/12/16
SPC-SS-NS-80500	Material Toughness Requirements for Structural Steel Spec	Rev 8	8/4/14
SPC-SS-NS-80501	Structural Design Specification	Rev 2	9/12/13

11.0 References

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Oliktok Pipeline Company. 1995, Application for intended startup of Kuparuk Large Scale Enhanced Oil Recovery. May 24, 1995.

Oliktok Pipeline Company. 1995 Application for Notice Proceed, Final Conversion Authorization, November 2, 1995.

State of Alaska 1981. ADL 402294: Right of Way Lease for the Kuparuk Pipeline.

State of Alaska 1984. ADL 411731: Right of Way Lease for the Oliktok Pipeline.

Appendix A List of Abbreviations and Acronyms

AIP	Abandoned in Place
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
Availability	Percentage of time a system or equipment item is available for service
BOD	Basis of Design
BPCS	Basic Process Control System
C	Concentration
Ce	Exposure Coefficient
Code	Minimum system requirements established by technical professional organizations, such as the American Society of Mechanical Engineers
CPAI	ConocoPhillips Alaska, Inc
CPF	Central Processing Facility
Criticality rating	Assessment by integrated project team of equipment criticality. Established Q/A inspection level.
Ct	Thermal Coefficient
DCS	Distributed Control System
DOT	Department of Transportation
ESD	Emergency Shut Down
F&G	Fire & Gas
FEED	Front-End Engineering Design
GA/PA	General Alarm/Public Address
GKA	Greater Kuparuk Area
HCA	High Consequence Area
HSM	Horizontal Support Member(s)
HSS	Hollow Structural Steel
HVAC	Heating, Ventilation, and Air Conditioning
I	Occupancy Importance Factor
IFC	International Fire Code
ILI	Internal Line Inspection (In-Line Inspection)
IMP	Integrity Management Program (DOT)
Ip	Seismic Importance Factor
Iw	Wind Importance Factor
KOC	Kuparuk Operations Center
KRU	Kuparuk River Unit
LAN	Local Area Network
LG	Lift Gas
MI	Miscible Injection
MPH	Mile Per Hour

MSCFD	Thousand Standard Cubic Feet per Day
NGL	Natural Gas Liquids
OPC	Oliktok Pipeline Company
OPL	Oliktok Pipeline
OPLM	Oliktok Pipeline Manual
OSD	Operational Shutdown
PBU	Prudhoe Bay Unit
PCS	Process Control System
PCV	Pressure Control Valve
PFD	Process Flow Diagram
Pg	Basic Ground Snow Load
PLC	Programmable Logic Controller
PS1	Pump Station 1
Psf	Pressure per Square Foot
PSV	Pressure Safety Valve
PVD	Pipeline Vibration Dampeners
RAM	Reliability/Availability/Maintainability
REIM	Remote Electrical & Instrumentation Module
Reliability	Percentage of available time a system or equipment item will provide the intended service
RH	Relative Humidity
ROW	Right of Way
ROV	Remotely Actuated Motor Operated Valve (MOV). Labeled as MOV in Drawings.
RP	Recommended Practice
S1	Seismic Coefficient
SCC	Stress Corrosion Cracking
SD	Sustainable Development
SIS	Safety Instrumented System
SPCO	State Pipeline Coordinator's Office
Ss	Seismic Coefficient
Standard	A document that sets out COP requirements for a given scope of capital project execution
TAPS	Trans Alaska Pipeline System
TOR	Thread-O-Ring
TVA	Tuned Vibration Attenuators
UPS	Uninterrupted Power Supply
V	Velocity
VSM	Vertical Support Member(s)
WC	Watercut
WI	Water Injection
WIV	Wind-Induced Vibration

Appendix B Maps

- Map 1 – Project Scope Summary
- Map 2 – PS1 Area Scope
- Map 3 – Kuparuk River East Block Valve
- Map 4 – Kuparuk River West Block Valve
- Map 5 – CPF1 Area Scope